REMARKS

In the Office Action, the Examiner issued a final rejection of Claims 1, 4-7 and 16-18, which are all of the pending claims, under 35 U.S.C. 103 as being unpatentable over the prior art disclosed in the present application in view of U.S. Patent 6, 022,791 (Cook, et al.).

Applicants herein ask that independent Claims 1, 7 and 16 be amended to better define the subject matters of these claims. In particular, features of Claim 4 are being added to Claim 1. Claim 4 is thus being cancelled, and Claim 5 is being amended to be dependent from Claim 1 instead of the now cancelled Claim 4.

For the reasons set forth below, Claims 1, 4-7 and 16-18 patentably distinguish over the prior art and are allowable. The Examiner is, thus, requested to enter this Amendment, to reconsider and to withdraw the rejection of Claims 1, 4-7 and 16-18, and to allow these claims.

As discussed in detail in the instant application, this invention relates to a crack stop for low k dielectric materials of an integrated circuit. Crack stops, per se, are known, and they are used to prevent cracks that form during an IC dicing operation, from propagating into the active area of the IC chip, causing fails.

For example, as shown in Figure 1 of the present application, a metal crack stop that extends around a moisture barrier region can be used to prevent crack propagation. Such crack stop effectively prevent propagation of the cracks, but those cracks expose the copper in the metal stack to water vapor. This, in turn, allows moisture to enter the chip, which can lead to chip failure.

The present invention effectively solves this problem caused, in part, by the use of a metal stack water barrier. The invention does this by forming the crack stop as at least one trench or void between the moisture barrier/edge seal and the outer periphery of the IC chip, and extending the trench or void crack stop substantially completely between a bottom substrate and a top aluminum layer of the IC chip.

The prior art does not teach the use of such a crack stop in combination with a metal stack water barrier.

As indicated above, the crack stop used in the prior art discussed in the present application is itself formed of a metal stack.

Cook, et al. discloses, in Figure 3d, a crack stop formed by a trench 46. The portion of Cook, et al that discusses Figure 3d, though, does not address the specific problem of preventing crack stops when a metal stack moisture barrier/edge seal is used in the IC chip. Accordingly, Cook, et al. does not suggest any specific solution for that problem.

In the Office Action, the Examiner argued that Cook, et al. does address this problem. However, the Examiner's reasoning for this contention is that Cook, et al. addresses this problem "because the [prior art] addresses in Fig. 1 [of this application] such specific problem." Applicants submit that this reasoning shows that, in fact, Cook, et al. itself does not address this problem. Moreover, in combining Cook, et al. with the prior art discussed in the present application, the Examiner is using hindsight reconstruction – that is, recognizing in hindsight, after being given the benefit of the teachings of the present application, that certain features of Cook, et al. can be used to address specific problems of the prior art. There is no teaching in Cook, et al. itself that this benefit can be achieved.

The present invention does address this specific problem. And this is done, not simply by using a deep trench, but, in addition, by locating the deep trench in a specific position – outside of the metal stack moisture barrier/seal and between that barrier/seal and the outer periphery of the IC chip. This specific position – and the relationship between the moisture barrier seal and the crack stop of this invention – are not taught or suggested by Cook, et al.

Applicants ask that Claims 1, 7 and 16 be amended to emphasize the above-discussed difference between this invention and the prior art. In particular, each of Claims 1 and 6 is being amended to indicate expressly that the moisture barrier is comprised of at least one metal stack around the outer peripheral edges of the active area of the IC chip, and that the crack stop is located outside of this metal stack. Claim 7 presently describes the moisture seal as comprising a metal stack, and this claim is being amended to indicate expressly, similar to Claim 1, that the crack stop extends around this metal stack.

As explained above, this feature is of considerable utility because it helps to prevent the migration of the cracks to the metal stop water seal. This feature thus prevents the cracks from leading to oxidation of the water seal – a problem that is not addressed by the device shown in Figure 3d of Cook, et al.

In view of the above-discussed differences between Claims 1, 7 and 16 and the prior art, and because of the advantages associated with those differences, Claims 1, 7 and 16 patentably distinguish over the prior art. Claims 4-6 are dependent from Claim 1 and are allowable therewith; and Claims 17 and 18 are dependent from, and are allowable with, Claim 16.

It is noted that the requested changes to the claims only elaborate on features already described in the claims. For Example, claims 1 and 16 presently describe the moisture seal, and it is herein asked that the claims be amended to indicate that this seal is formed of at least one metal stack. Likewise, Claim 7 currently describes that metal stack, and Applicants ask that this claim be amended to indicate more expressly that the crack stop extends around this metal stack. In view of this, it is submitted that entry of this Amendment is appropriate, and such entry is respectfully requested.

For the reasons discussed above, the Examiner is asked to enter this Amendment, to reconsider and to withdraw the rejection of Claims 1, 4-7 and 16-18 under 35 U.S.C. 103, and to allow these claims 1, 4-7 and 16-18. If the Examiner believes that a telephone conference with Applicants' Attorneys would be advantageous to the disposition of this case, the Examiner is requested to telephone the undersigned.

Respectfully submitted,

John S Sensny

John S. Sensny
Registration No. 28,757
Attorney for Applicants

SCULLY, SCOTT, MURPHY & PRESSER
400 Garden City Plaza – Suite 300
Garden City, New York 11530
(516) 742-4343

JSS:jy